GAS JOURNAL

Vol. 259 **101st Year** **August 3, 1949** **No. 4496**

THE DOMESTIC LOAD

'THE sheet anchor of the gas industry in Britain is the domestic cooking load.' This sentence may be taken to sum up Mr. Stirling Everard's Institution report presented at the recent Congress of the International Gas Union. It is probably essentially true of the gas industry in most of the countries where the industry exists at all, though it may take a slightly different form in some of them. For instance, in the United States of America, where the American citizen loves to eat out often and well, a substantial part of the cooking load is transferred to the commercial kitchen. The report, based upon data collected in the area of supply, of the Gas Light & Coke Company, though data relating to a number of undertakings elsewhere in Britain were taken into consideration, is still very much coloured by London experience. It is common knowledge that consumption per consumer is higher in some provincial districts, but data are lacking to show whether consumption per domestic consumer is appreciably different. Most of the very large increases in total consumption are traceable to shifts in population and increases in industrial demand.

The picture of the changed, and changing, incidence of demand is well drawn. Something more might have been said about the changing relation between the price of gas and those of alternative fuels and forms of energy. It is pointed out that there has been a sharp rise in price of gas—of the order of 80%—but, in the first place, the price of household coal has increased practically as sharply, and that of coal to the gasworks more sharply still. And, while it is true that a comparable increase in electricity prices has been delayed, this must catch up very soon. One day the vast capital expansion in the electricity industry will have to be financed, for the brutal truth is that while gas is paying its way, electricity is not—yet.

The noticeably greater demand in the small households of the wage-earning classes, following upon full employment and higher wages, and accentuated, by the way, in recent winters by the difficulty of getting solid fuel, would have been noticeably greater still had it not been checked by a number of factors, most of which are noted in the report. Chief of these is the unsuitability of the houses themselves to take full advantage of the facilities and conveniences offered by gas. It is noted, for instance, that the reconstruction of housing resulted in an increase from 111 to 152 therms per annum, and that new housing increased this to 160 therms within the same class of consumer. But it must be remembered that even in this new housing the design has been very far from based upon the full use of gas. The most that can be said of most of it is that room was provided for the meagre equipment of a gas cooker and a gas wash-boiler—apparatus which has previously been squeezed in on a landing in the squalid conditions exhibited in the interior photographs of a 19th century working class house. We doubt very much whether more than a negligible fraction of the council estates which have been built out of public funds for the express purpose of providing homes for the working classes, are commonly designed to make the best use of modern fuel service. True, often under pressure from the gas undertaking, they have commonly been piped for gas as well as wired for electricity, notwithstanding that many local councillors wished to economise by omitting the former. But how many of them have been designed to make the best use of gas service? Indeed, is the industry itself quite sure what the design to this end should be? Do we not still await the findings, not of the Abbotts Langley experiments, but of the amendments to those experiments somewhat tardily forced upon the Building Research Committee by the gas industry, or, rather, certain active elements in it? And what, by the way, has been the result to date of the Kensal Green experiment? How have the tenants of these flats fared with their gas and coke equipment in these adventurous years, in comparison with similar tenants dependent on solid fuel?

At any rate, at the moment the demand for gas is being severely limited by the very unsatisfactory housing conditions of consumers both 'tied' and 'free.' Houses erected well after the end of the 19th century permit nothing beyond a very low minimum of gas installation, and although the working class consumer is now in a position to buy more gas and some more appliances he cannot face the reconstruction of his house to accommodate them. The consumer, often anxious to make fuller use of gas, is prevented from so doing by the structure of the home. This theme is well developed in the report, but we are not sure that the correct conclusion is reached—that of the necessity for a well thought-out policy for the new housing of this type and for that policy to be strongly and competently supported and urged in the right quarter. Yet even if that were done and acted upon there remains the difficult problem of the free consumer, living in the privately owned dwelling where neither he nor the landlord is able or willing to face up to the cost of installing the new apparatus and the piping to supply it. And—without the apparatus there is no load. Ultimately the standard of comfort enjoyed by the dwellers in the council estates will fix the standard that the free consumer will demand when he is in a position to do so. Until then this remains one of today's problems.

In the middle-class and well-to-do homes the factors and problems are a good deal different. The shortage of domestic help, for instance, may have curious and contradictory effects. Generally it has been observed that the absence or curtailment of domestic help reduces waste. This will be true in the use of gas, and to it must be added the obvious reduction in consumption due to the reduction in the number of persons in the household. On the other hand, the absence of servants to attend to solid-fuel fires increases the incentive to use gas for cooking, and particularly for space-heating where the labour saving qualities of the gas fire are so obvious. Particularly in this class of demand the influence of fashion and taste is very great. Here the

design of gas appliances has a great work to do. It must achieve modernity. It must break down the notion that alternatives are more up-to-date. Maintenance by the supplying undertaking must ensure that all appliances are kept in good condition as well as installed in the first place in a condition and under conditions conducive to effective service.

Much has been said in this report and in other papers presented in June about the seasonal load and the means of reducing the peak and meeting peak loads. The abandonment, on the ground of its ineffectiveness, of the winter surcharge on electricity may give rise to some erroneous conclusions. The very interesting, and for a time very effective, device of a substantial rebate in the summer months, which was tried by at least one progressive undertakings, merits further attention. This rebate may not encourage the consumer to put anything aside to meet his winter bills, but it does encourage him to develop summer loads, to use the cooker, water heater, and gas fire more freely, and to put the kitchen coal range out of action to his own greater comfort. And these habits are carried over into the winter.

Finally, it is to be hoped that the short closing sections of the report on certain special and quasi-domestic loads will be expanded in a future publication.

NATIONALISATION : EFFECT AND CAUSE

THERE was a short debate in the House of Commons last week on fuel and power, with special reference to coal, gas, and electricity. The debate was initiated by Mr. M. S. McCorquodale, who said the country deserved a fuller statement about coal stocks and requirements, and he asked for information in regard to the restocking of gas and electricity undertakings. He complained bitterly of the public relations department of the Ministry of Fuel and Power and of the National Coal Board spending public money on partisan propaganda. Mr. A. Palmer asked the Minister for more details concerning the supply of electricity generating equipment, and Mr. P. G. Roberts inquired into the meaning of a 'service charge' for coal ranging from 1s. to as much as 5s. a ton. The question of compensation to gas stockholders was discussed at some length by Colonel R. S. Clarke, who reminded the Government that 'evil is wrought by want of thought, as well as want of heart.' He also recalled what the Minister said when the Gas Bill was being considered by Standing Committee in 1948 (April 22) to the effect that gas stockholders were exchanging an equity —an ordinary—share for gilt-edged stock. And what, asked Colonel Clarke, is the worth of gilt-edged stock now? It has fallen 7% in the first three months of gas industry nationalisation. He also recalled the statement of Mr. Brendan Bracken on the previous day (April 21) in Committee: 'We fear that tens of thousands of gas stockholders are going to be swindled.' A further major point raised concerned the increases in the cost of fuel and energy since nationalisation became a *fait accompli*.

Time was short, said Mr. Hugh Gaitskell in reply. The weather was hot ; and he asked further would-be contributors to the debate not to be silly and to sit rather than stand and deliver. Regarding price increases, Mr. Gaitskell remarked: 'I have recently been looking at the increase in fuel and power prices since 1947. . . . It amounts to 11%, which is just the same as the average increase in all domestic prices during that period. Therefore, the idea that prices in the nationalised industries have gone up exceptionally by comparison with those in other industries is simply nonsense. As a matter of fact, in every case the increases in costs that have taken place in coal, gas, and electricity would have had to take place if those industries had remained in private enterprise.' As to coal output, Mr. Gaitskell hoped that nobody would dub him as being complacent. He did not regard matters as being entirely satisfactory. On the other hand, there was no cause for deep gloom. The coal stock position at the moment was what was planned for, and there was no reason why they should not reach the expected level of 16,500,000 tons by the beginning of the coal winter on November 1. Except in the case of industrial stocks, which were exceptionally high last year, most of the other consumers had stocks at approximately the same level as last year. And then he came to the coal 'service charge,' stating that (though he did not want to get involved in matters of day-to-day administration) from May 1 last the restrictions which had hitherto existed so far as the wholesale trade was concerned were removed. That meant that anybody who wanted to could buy direct from the Coal Board provided they fulfilled 'certain conditions' ; and the Coal Board said quite properly, 'If we are to provide certain services for customers we shall make a charge for such services.' In any case, consumers were quite free to use the factor and not go direct to the N.C.B.

There was finally the Minister's reply to the question of gas shareholder compensation. 'I cannot go into detail,' said Mr. Gaitskell, 'but, so far as the payment of interest is concerned, the Second Schedule to the Gas Act provides for the payment of interest on unvalued gas securities to be made by the Gas Council as and when directed by the Minister, and that will be done. The first interest date is November 1, and we are arranging for the Council to make provisional payments of interest on that date to holders of unvalued gas securities.' And what about the capital of the unfortunate people? asked Mr. Bracken. To this query Mr. Gaitskell observed that the possibility that holders of gas stock would suffer from a fall in gilt-edged had always existed, along with the equal possibility that there would be a rise in gilt-edged stocks which would benefit the holders of these securities. Last week, however, wild conditions prevailed in the gilt-edged market. On the Tuesday Gas 3% 1990-95 ended £1 down at 92¼ ; at the close of the week the stock, marked down to 90, finished at 91¼. There are signs of recovery, but there is lack of confidence in the air.

CONSERVATION OF FUEL RESOURCES

The need for a speedy reduction in coal prices, which found so large a place in the recent annual report of the National Coal Board, is again reflected by both the Industrial and the Domestic Coal Consumers' Councils in their second annual reports to the Minister of Fuel and Power which were published last week. The industrial council state that although they hope for a reduction in costs, the best means of achieving this end lies in the increased efficiency by the consumer in the use of coal and steam. A 25% increase in efficiency would result in a saving of at least 20% in consumers' fuel costs and every ton of coal saved would be released for other purposes. The report finds it encouraging that in its first year of working the British Electricity Authority, in conjunction with the National Coal Board, has been able to achieve a more consistent quality of coal delivered to industrial stations. The domestic council, in its report, are strongly of the opinion that the most promising advance towards both the satisfying of the consumer and the conservation of fuel supplies lies in the installation of modern solid fuel appliances.

THE JUNIORS AND THE I.G.E.

In his address as President of the Western Junior Gas Association, Mr. J. W. Denton, of the Torquay gas undertaking, pointed out that the Junior Associations are not, in fact, independent. He made the pertinent observation that facilities have been given for the juniors to travel and, in most cases, expenses have been met by constituent undertakings. If this is to continue, he argued, it will be regarded that the Junior Associations must serve more than one purpose. They will still provide a platform to allow free expression of opinion, but, on the other hand, it can easily be visualised that the administration of the area might well require the junior association concerned to discuss or explore a specific problem peculiar to that area. 'This two-fold object of an association,' went on Mr. Denton, 'necessarily encloses the association in boundaries which conform to the area Board;

and I feel that the sooner we realise this the smoother will be our relationship with the area Boards.' 'It will also,' he said, 'be highly desirable to make ourselves part of the Institution of Gas Engineers as a Junior District Association on lines similar to other chartered engineering bodies. In this way we shall be able to discuss problems which have been presented to the Institution at district meetings, and a close liaison will be effected between research and practical application. Constituted in this manner the associations may help considerably to build up area education schemes and transfers during training.' While we agree with Mr. Denton that closer linking of the junior associations with the Institution of Gas Engineers is desirable and probably inevitable, we cannot see why the boundaries of a junior association should necessarily conform to those of any particular area Board. There are considerations of far more importance than that of mere neatness. An over-neat area Board may well prove tidy, but ineffectual.

THE CHANGING OUTLOOK

This was the title chosen by Mr. John Wilkinson, of Sheffield, for a paper which he gave recently to the Yorkshire Junior Gas Association. In it he referred at some length to the question of labour for the unpleasant job of emptying and filling purifier boxes—a 'black spot' from a manpower point of view. For the 12 months ended October, 1948, 294 men were interviewed for all classes of work by the Sheffield gas undertaking. Of these, 137 men were given jobs—46% of those who presented themselves for interview. Of the men started, 46 (33%) were allocated to the purifying house. At the end of the 12 months the complement of 12 men was maintained. The undertaking lost and gained a man at an average rate of one a week; and this in spite of the fact that the work carries a higher rate of pay than is the normal. 'We have been faced,' said Mr. Wilkinson, 'with a point blank refusal to carry out the work of box emptying when detailing the necessary extra labour. The inevitable result is that a man is lost, and in most cases a good man. In our case these men are to a degree "picked," but unfortunately there is no alternative but to lose the man, as allowing an employee to choose his own work cannot be tolerated if authority is to be maintained.' The author suggested that greater attention should be paid to further mechanisation, to the installation of tower purifiers, and to liquid purification. The complement in the oxide box section at one of the gasworks at Sheffield is 12, plus a charge hand and an attendant—*i.e.*, a total of 14. If the sum of £3,750 be taken as the value of one man (on a 3% interest and sinking fund basis and a repayment of 20 years) the purifying complement represents £52,500. Mr. Wilkinson asked whether this capital expenditure figure would justify considering the installation of a plant of the 'Manchester' process type. The query should provoke thought.

Personal

For his assiduous work during the inaugural year as its first Chairman, Mr. STANLEY HOPKINSON, Public Relations Officer to the Liverpool gas undertaking, has been unanimously elected Vice-President of the Liverpool and District Publicity Association.

* * *

The North-West Area of the Association of Scientific Workers, at the July Area Delegate Meeting held in Manchester, elected Mr. J. GASKARTH, B.SC., ASSOC.M.INST.GAS E., to be Chairman of the North-West Area Executive Committee. Mr. H. B. GIDLOW, ASSOC.M.INST.GAS E., was also elected to the Committee. Mr. Gaskarth and Mr. Gidlow are respectively Chairman and Secretary of both the Merseyside Gas Industries Branch and the National Gas Industries Committee of the Association. Mr. Gaskarth's election is noteworthy because this is the first time a Liverpool member has become Area Chairman.

* * *

Mr. J. A. BUCKLEY, A.M.I.MECH.E., ASSOC.M.INST.GAS E., A.M.INST.F., has been appointed Sales and Service Manager of the North Middlesex District of the North Thames Gas Board, and has taken up his appointment at Finchley. Mr. Buckley joined the Gas Light and Coke Company in 1934 as a staff pupil in gas supply, and later joined the Service Superintendent's staff of that Company. During the war, he served in the R.A.F. as an engineer, being demobilised from the Middle East as a Flight Lieutenant Tech. (Eng.). Returning to the gas industry in 1946, he was appointed as Service Supervisor, Westminster and Battersea Depôts, Gas Light and Coke Company, and held that position until taking up his present post. Since the war he has also been teaching the major course Institution of Gas Engineers Gas Supply at Westminster Technical College, on a part-time basis.

Gas Consultative Councils

The Minister of Fuel and Power has announced the names of the members of five more Gas Consultative Councils, details of which are given below. With the North Western Gas Consultative Council already appointed, as announced in the *Journal* of July 20, the membership is now known of half the 12 Councils which are to be set up, one for the area of each of the 12 Gas Boards, to represent the interests of consumers. The Chairmen of the 12 Consultative Councils were given on p. 438 of the *Journal* for May 25.

East Midlands

Councillor W. ALBANS (Scunthorpe), Miss F. BONAS, J.P. (Duffield), Mr. G. W. BRASSINGTON (West Bridgford, Nottingham), Mr. W. BROWN (Chesterfield), Mr. L. CHAPMAN (Sheffield), Mr. W. CHARLES (Leicester) Mr. M. CREIGHTON (Swinton), Councillor E. S. EVERITT (Lincoln), Mr. W. H. FOSTER (Warsop, Mansfield), Mr. F. A. HERON (Leicester), Alderman Mrs. R. HUDSON (Balby), Mr. E. LESTER (Loughborough), Councillor H. C. MARTIN (Chesterfield), Mr. W. B. RANKINE (Corby), Capt. J. F. RICHARDSON (Hundleby, Spilsby), Mrs. D. I. ROE (Greenway, Northampton), Alderman W. SHARP (Nottingham), Alderman B. H. SINDALL (Grantham), Alderman A. SMITH (Sheffield), Mr. F. C. SOWTER (Huthwaite, Mansfield), Mr. A. J. TAPPING (Littleover, Derby), Mr. G. H. WHITE (Sheffield).

Northern

Alderman Mrs. B. F. C. ADAMS, (Berwick-on-Tweed), Mr. W. L. BARKER (Sunderland), Councillor Mrs. E. BELL (Stanley, Co., Durham), Councillor C. B. BOYCE (Lemington, Northumberland), Colonel R. N. CARR, M.C., J.P. (Carlisle), Mr. N. CARROW (Bedlington Station), Colonel R. CHAPMAN, C.B., C.M.G., C.B.E., D.S.O., T.D., D.L. (Souht Shields), Mr. F. COVERDALE (Spennymoor), Councillor Mrs. J. HUGGINS, J.P. (Southwick, Sunderland), Mr. J. W. HARRISON (Darlington), Councillor T. H. HURST (Newcastle-upon-Tyne), Mr. M. J. NEWTON (Workington), Alderman A. A. RENNIE, J.P. (Jarrow), Councillor J. ROBERTSHAW (Langley Park), Mr. I. G. SIM (Penrith), Councillor H. N. SUTCLIFFE (Houghton, Carlisle), Mr. M. TATE (Ferryhill), Councillor L. TAYLOR (Green Hill, Middlesbrough), Mr. C. F. TIDMAN, O.B.E. (Loftus, Saltburn), Mrs. A. W. WAKEFIELD, B.A. (Keswick), Alderman P. M. WILLIAMS, J.P. (West Hartlepool).

South Western

Mr. J. E. ATTWOOD (Bristol), Mr. A. W. BALMER (Stroud), Mr. W. J. BROCKMAN (Torquay), Mr. H. D. BROOKS, J.P. (Yeovil), Councillor H. T. BUSH, J.P. (Cheltenham), Councillor H. G. DAMERELL (Plymouth), Councillor A. W. J. DYMOND (Swindon), Councillor Mrs. E. J. EXELBY, J.P. (Redruth), Mr. E. W. HEARLEY, J.P. (Falmouth), Alderman T. T. LANE (Penzance), Mr. R. L. LINEY (Teignmouth), Mr. A. C. MOLE, J.P. (Taunton), Mrs. G. M. MORSE (Langport), Mr. H. MORLAND (Glastonbury), Councillor Mrs. L. NEWBURY (Plymouth), Alderman F. D. NEWCOMBE (Exeter), Mr. L. G. NORTHCROFT, O.B.E. (Cheltenham), Councillor R. W. PEARSON (Bath), Cuncillor L. J. POOLE (Westbury-on-Trym, Bristol), Mrs. B. J. SHELL (Melksham), Miss J. STEPHEN (Bristol), Mr. F. G. UNDERHILL (Chagford, Devon).

Wales

Mr. G. ADAMS (Seven Sisters, Neath), Mr. W. ALLMAN (Pontypool), Sir WYNNE CEMLYN-JONES (Penmaenmawr), Mrs. E. CHALKE, J.P. (Cardiff), Councillor Mrs. E. M. CROCOMBE (Aberkenfig, Bridgend), Councillor M. HARCOMBE, B.E.M. (Trealaw, Rhondda), Alderman A. E. HARRIES (Swansea), Mrs. H. HARRY (Harlech), Mr. W. HOWLETT (Cardiff), Mr. W. D. HUGHES (Llanelly), Mr. S. T. ITHELL (Hawarden), Alderman S. JONES (Blackwood), Miss D. G. MISKIN (Swansea), Councillor J. W. MORGAN (Builth Wells), Mr. W. A. NASH (Newport), Alderman R. G. NOOTT, J.P. (Haverfordwest), Mr. T. W. RODERICK, J.P. (Tonyrefail), Councillor R. G. SHUTE (Cardiff), Alderman R. S. TYACK (Newport), Councillor L. S. UNDERWOOD (Llandudno), Councillor B. WATKINS (Merthyr Tydfil), Alderman E. WILLIAMS (Wrexham).

West Midlands

Mr. H. BAKER, J.P. (Birmingham), Mr. B. BILBOE (Bilston), Mr. E. DUNCAN BROWN (Birmingham), Councillor S. J. BROWN (Birmingham), Councillor Mrs. M. DALE (Wolverhampton) Alderman W. EVANSON (Newcastle-under-Lyme), Mr. J. FALLON, J.P. (Smethwick), Mrs. FARRAN (Shrewsbury), Mr. W. M. W. FELL (Bridgnorth), Councillor F. G. GREGORY (Wollaston, Stourbridge), Councillor H. HEWITT (Hanley), Alderman C. HOLMES (Warwick), Mrs. M. JACOB, J.P. (Lichfield), Councillor W. KELLEY (Walsall), Mr. R. A. MADDOCK (Burslem), Mr. H. J. PARAMORE (Redditch), Mr. C. W. PARKES, J.P. (Willenhall), Councillor W. T. PRINCE (Nuneaton), Councillor Mrs. A. J. STEVENS, J.P. (Coventry), Mr. G. TATTON (Leek), Mrs. E. O. THOMPSON (Birmingham), Alderman P. WILLIAMS, J.P. (Shelton).

Obituary

Sir ERNEST VARVILL HILEY, K.B.E., Chairman of Glover & Main, Ltd., died at his home in London on July 19. He was born in 1868 at Wharfedale, Yorkshire, and was admitted a Solicitor in 1891. After various appointments on the West Riding County Council and at Birmingham he was appointed Town Clerk of Leicester in 1902, and in 1908 took up the important appointment of Town Clerk of Birmingham. During his tenure of office as Town Clerk he showed himself to be a man of great business and administrative ability. He held this office for eight years, and during that time there were, under his guidance, many developments in local affairs, including the greatest boundary extension scheme ever undertaken by a local authority. In 1916 Sir Ernest resigned his appointment when he joined the Board of the Metropolitan Carriage, Wagon, and Finance Company, Ltd., of which he subsequently became Chairman. During this time he also assisted Mr. Neville Chamberlain, who was then Director-General of National Service, and he was himself later appointed Deputy Director-General. For his great ability in this war work he was in 1918 created a Knight Commander of the Order of the British Empire. In 1922 he was elected Unionist Member of Parliament for the Duddeston Division of Birmingham, but retired before the general election in the following year. He had been a member of the Board of the Victualic Company, Ltd., a subsidiary of Stewarts & Lloyds, Ltd., since April, 1943. Sir Ernest was appointed to the Board of Glover & Main, Ltd., and its associated companies, Thomas Glover & Co., Ltd., R. & A. Main, Ltd., and Main Water Heaters, Ltd., in June, 1934, and became Deputy Chairman in 1939. When the then Chairman, Mr. Kenneth Aird, died in 1941 he was appointed Chairman of the companies, and he held this office throughout the very difficult war years and until the time of his death. After the war he gave up his practice as a Parliamentary Agent to devote himself entirely to the affairs of the Company. His shrewd judgment and business ability will be greatly missed by his colleagues, as also his tact, courtesy, and kindliness, by all those with whom he came in contact both within and outside his business life.

A Memorial Service was held at the Grosvenor Chapel, South Audley Street, London, on July 27, which was attended by members of the family, representatives from Glover & Main, Ltd., its associated companies, and other official bodies with which he was connected.

1949 *JOURNAL* DIRECTORY

In order to keep the Directory information up to date, the following alterations and corrections which have been notified during the past month should be noted in the 1949 issue of the *Gas Journal Calendar and Directory:*

Page 10.—BEDFORD GROUP: Delete R. Turner *GM & S.*

„ 24.—COVENTRY: A. E. West *E & M* vice J. E. Wakeford.

„ 56.—PEMBROKE DOCK: Delete L. W. Nuttall *MD.*

„ 60.—REDDITCH: P. E. Gallaher *E & M* vice C. F. W. Rendle *E & WM;* delete C. R. Hackett *S & CM,* retired.

„ 66.—SHREWSBURY: Delete C. M. D. Belton *D,E,M & S;* A. V. Wainwright, *W Sup,* becomes *E & M;* F. Caudwell, *Dist Sup,* becomes *W Sup;* add A. S. Greenway *Dist Sup.*

„ 68.—SOUTHAMPTON: Delete S. E. Whitehead *MD.*

„ 70.—STOKE-ON-TRENT: J. S. Warrilow *CE & GM* vice J. E. Stanier.

„ 76.—WALSALL: E. A. Goodland *M* vice A. Allen *GM & CE.*

„ 86.—BARRHEAD: Delete G. Hamilton *E & M.*

„ 163.—INSTITUTION OF GAS ENGINEERS: *President,* C. H. Chester; *Vice-Presidents,* F. M. Birks and J. H. Dyde.

„ 168.—MANCHESTER DISTRICT ASSOCIATION: *President,* J. D. Ashworth (Blackburn).

„ 168.—MIDLAND ASSOCIATION: *President,* S. J. Sadler (Solihull) until March, 1950, then K. L. Pearce (Leicester).

„ 169.—SOUTHERN ASSOCIATION: *President,* J. H. Dyde; *Senior Vice-President,* T. C. Batersby; *Junior Vice-President,* W. K. Tate.

„ 169.—WALES AND MONMOUTHSHIRE ASSOCIATION: *President,* Darrell W. Rees (Pembroke Dock); *Senior Vice-President,* J. Powdrill (Pontypool); *Junior Vice-President,* A. Pickard (Llanelly).

„ 169.—LONDON AND SOUTHERN JUNIOR GAS ASSOCIATION: *President,* A. H. Savill (Wandsworth); *Senior Vice-President,* T. V. Garrud (North Thames); *Junior Vice-President,* J. D. C. Woodall (Maidstone).

Additions to the revised edition of the *Gas Board Personnel Supplement,* too numerous to list here, have been published during the past month on pages 126, 162, 211, and 259 of the *Journal.*

News in Brief

We Are Informed by the Dowson and Mason Gas Plant Co., Ltd., Manchester, that Mr. Fred Harrison, who took part in the discussion on the Presidential Address of Mr. D. M. Kerr to the Waverley Association of Gas Managers, is not, and never has been, a member of the firm's staff.

A Revised Syllabus and Rules for examination for membership has been issued by the Institution of Heating and Ventilating Engineers. The syllabus will come into operation on Jan. 1, 1951. An introductory note reminds new candidates that questions relating to examination cannot be considered until the requisite proposal for joining the Institution has been submitted, and that no fees should accompany such a proposal.

The First Meeting of 1949/50 session of the Southern Association of Gas Engineers and Managers, (Western District) was held at the Imperial Hotel, Exeter, on July 21. Mr. A. H. Dunn, of the Launceston gas undertaking, was introduced by the retiring Chairman, Mr. Wm. Verity, of Newton Abbot, as Hon. Secretary, taking the place of Mr. J. H. Cornish Jr., of Bridgwater, who had been Hon. Secretary since 1933. Mr. Cornish, who had been elected Chairman for the session, subsequently delivered his address.

Stirling Town Council, at a recent meeting, agreed to protest to the Secretary of State for Scotland against the serious reduction in rateable valuation following the taking over of the Stirling gas undertaking. A decrease of £7,094 on the rateable valuation was reported, and a letter from the Assessor of Public Undertakings, which stated that the last date for lodging appeals against valuations prepared by his department was May 26, and that the valuation in question for the year 1949-50 was now final and not subject to review, was submitted. The Clerk indicated that the Council were first informed of the valuation on June 2.

The Summer Meeting of the London & Counties Coke Sales Circle, held on June 27, was well attended. Members met at Gas Industry House and parties were transported by coach to either Fulham, Kensal Green, Rotherhithe, or Wandsworth gasworks. Due to the efforts and co-operation of the staffs at the works concerned, a most interesting afternoon was spent in viewing the coke production and preparation methods employed on a modern gasworks. Later the parties re-assembled at Gas Industry House for a buffet tea followed by a film show at which the Chairman, Mr. F. S. Evans, presided. Two films entitled: 'Behind the Flames' (loaned by North Thames Gas Board), and 'Coke' (loaned by South Eastern Gas Board) were shown, and proved of interest and value in supplementing the visit to the works.

SHEFFIELD STREET LIGHTING

The eleventh report of the Lighting Department of the City of Sheffield covering the period from April, 1947, to March, 1949, states that during the past year there has been an increase of almost 34 mill. cu.ft. in gas consumed in public lighting, accountable for by the 25% increase in consumption which was permitted by the Ministry of Fuel and Power in June, 1948. Gas consumption during the past year amounted to 129,684,050 cu.ft. During the period under review the number of gas lamps in use decreased from 12,563 to 12,410, covering 412 of the 677 miles of streets lighted at March 31 this year. Mr. J. F. Colquhoun, Lighting Engineer, deplores in his report the apparent tolerance or indifference of the public in failing to report street lighting defects, and directs attention to the increasing atmospheric pollution of Sheffield's atmosphere, which has necessitated for the first time the removal of parts of the fittings of high-mounted street lamps on traffic routes for cleaning in the Department's workshops. This has entailed increased expenditure to the Department in maintaining a given standard of cleanliness. He also says that the wholesale destruction of street lighting plant which occasioned serious concern during the enforced black-out in the beginning of 1947 has ceased, and the amount of damage is now no greater than it was before the war.

Diary

Sept. 6 and 7.—**Irish Gas Association:** Annual Meeting. Alliance and Dublin Consumers' Gas Company's Lecture Theatre, D'Olier Street, Dublin.

Sept. 8 and 9.—**Combustion Engineering Association:** Conference on the Rational Allocation of Coal, Palace Hotel, Buxton.

Sept. 15.—**North British Association:** Annual General Meeting, Music Hall, George Street, Edinburgh.

FUEL SUPPLY IN GREAT BRITAIN

By H. D. GREENWOOD, M.Sc.,
Director of Carbonisation, National Coal Board

Recently the author gave at a meeting of the Energy-Economic Institution at the University of Cologne a comprehensive paper reviewing the supply of fuel (in the form of solid fuel, electricity, gas, and oil) over the past 10 years in the United Kingdom. The following is an extract from the paper. The figures given and the analysis presented will prove of much value.

Table I shows the production and consumption of coal, coke, electricity, gas, and oil fuel in 1938 and 1947. The consumption figures are sub-divided into different consumer groups to show the trend of consumption by these different groups.

The figures given show certain definite tendencies:—

(1) A decrease in coal production, but practically no change in total inland consumption since 1913. The distribution of the inland consumption has, however, changed considerably.
(2) A decrease in domestic consumption of coal.
(3) An increase in coal consumption for electricity and gas production.
(4) A small increase in the production of coke oven coke.
(5) Increased domestic and industrial consumption of coke.
(6) A large increase in fuel oil consumption.

The decrease in direct coal consumption has been largely counterbalanced by increased carbonisation of coal and use at electricity generating stations. Gas production has increased by 124,000 mill. cu.ft., or about 40%, and electric power by 15,000 mill. kW, or 75%.

About 60% of the total gas consumption is taken by domestic consumers and this proportion has not materially altered. On the other hand, lighting, heating, and cooking by electricity account for 42% of the total consumption and, of this figure, it has been estimated that about 26% is supplied to truly domestic premises. The consumption for power purpose has increased in roughly the same proportion as the domestic and commercial consumption.

The quantity of coke oven gas sold to gas undertakings has nearly doubled in the 10 years, although the coal carbonised at coke ovens has only slightly increased. The large increase in fuel oil consumption has taken place during the past two or three years and is largely attributable to the Government's policy of encouraging the use of oil to conserve coal.

TABLE I

Comparison of Production and Consumption of Solid Fuels Electricity, Fuel and Oil

	1938	1947
Coal (mill. tons):		
Coal output	227	197
Inland consumption (available for)	181	192
Domestic	45.8	31.6
Industrial	42.0	39.7
Gasworks	19.1	22.57
Coke ovens	19.1	19.8
Electricity undertakings	14.9	27.1
Railways	13.2	14.6
Coke (mill. tons):		
Production:—		
Gas coke (net after deducting used in works)	7.21	7.78
Hard coke	12.83	13.81
	20.04	21.59
Consumption:—		
Iron and steel and engineering	9.45	10.67
Domestic	2.52	3.55
Electricity (mill. kWh.):		
Generated (authorised undertakings and transport)	24,546	42,733
Hydro power	988	1,100
Industrial firms (estimated), including collieries	—	12,000
Consumed:—		
Domestic	5,360	12,724
Industrial (including shops, offices and commercial premises and public lighting)	13,792	21,695
Traction	1,249	1,362
Total	20,401	35,781
Gas (mill. cu.ft.):		
Gas made	319,550	432,413
Gas brought from coke ovens	29,621	53,984
	349,171	486,397
Gas consumed:—		
Domestic	210,000 (estimated)	293,670
Industrial (including commercial and public lighting)	112,086	152,416
Total	322,086	446,086
Oil (mill. gal.):		
Fuel oil and diesel oil	286	642

Comparison of Fuel Consumption in Thermal Units

The figures which have been considered show the trends of consumption of the different types of fuel. In order to render them directly comparable they have been converted into thermal units (Table II). It will be noted that, on a thermal basis, the reduction in the consumption of coal is practically counterbalanced by the increased consumption of thermal energy in the form of coke, gas and electricity.

TABLE II

Total Fuel Consumption in Therms
(mill. therms)

	1938	1947
Coal (excluding used at coke ovens, gasworks, and power stations)	36,400	33,913
Coke	4,850	5,790
Gas	1,755	2,320
Electricity	700	1,210
Total heat consumed	43,705	43,233

Examination of Trends of Fuel Consumption

The figures in Tables I and II have shown the trends in overall consumption of the different types of energy. It is of interest to analyse these in more detail, and particularly the domestic consumption.

The figures in Table III show the domestic consumption of coal, coke, and the tons of coal required for the production of electricity and gas.

TABLE III

Fuel used to Supply Domestic Heat and Light Requirements
(tons of coal)

	1938	1947
Direct combustion of:		
(*a*) Bituminous coal	44.20	29.00
(*b*) Anthracite	1.60	2.60
(*c*) Gas coke	0.90	2.22
(*d*) Coke oven coke	1.61	1.33
	48.31	35.15
Coal used to supply domestic electricity consumption	3.90	9.00
Coal used in manufacture of gas and coke for domestic consumption	7.40	10.30

There has been a considerable decrease in domestic consumption of coal. This is due to the restriction on coal and coke supplies and to the increased use of electricity and gas for heating, &c., which is about 70% greater than in 1938. The increase in gas and electricity consumption has undoubtedly been considerably influenced by the fact that these fuels are 'on tap' and not rationed as with solid fuels. Sales of gas and electricity appliances have been much restricted, and this also has imposed a check on consumption.

Consumers' Statistics

Change in the grouping of consumers during the past 10 years is shown by the following figures:

TABLE IV

	1938	1947
Total population (mill.)	47.76	50.0
Electricity:		
Total consumers (× 1,000)	10,113	11,481
Consumption:—		
(*a*) Per head of population	420	715
(*b*) Per consumer (kWh.)	2,010	3,117
Gas:		
Total consumers (× 1,000)	11,215	11,612
Domestic consumers	10,000 (estimated)	10,922
Consumption per head of population (cu.ft.)	6,750	8,920
Consumption per consumer	29,200	40,000

Electricity consumers have increased by 1.3 mill., and gas consumers by about 400,000, but the consumption per consumer has increased considerably with both gas and electricity. These figures taken in conjunction with the reduction in consumption of coal by domestic consumers indicate the trend to replace solid fuel by electricity and gas.

There have been marked alterations in the costs of different types of fuel since 1938. The cost of coal has increased by about 70% and coke by over 110%, as compared with an increase of 80% in the price of oil. The average electricity revenue has, however, only increased by about 10%, but supplies for power purposes have risen by about 35%.

The largest increases (about 70%) in gas prices have been in the London area, and the smallest in towns where coke oven gas is purchased and distributed.

The following figures show the changes in the costs of different fuels when calculated to a thermal basis:

	1938 Cost per therm	1947 Cost per therm	
Coal (industrial)	1.0	2.4 to 3.0	
Gas	5.5 to 8.6	6.8 to 13.5	
Electricity :			
Domestic	48	42	Based on average revenue
Power	19.5	26	
Oil	2.7	5.0	

It will be noted that the highest increase has taken place with solid fuels and fuel oil, and the least with electricity. Electricity and gas have thus become more competitive with solid fuels, and difficulty is found in meeting the demands for both these fuels, this being partly due to the fact that they have not been rationed like solid fuel. Industrial gas consumption is rapidly increasing and, for large industrial consumers, is still being supplied at about 5d. per therm. The differential between coal and gas has thus narrowed and industry is taking as much gas as it can obtain.

The figures in Table V show the trend of price levels from 1913 onwards. It will be noted that whereas domestic coal prices have increased by about 75% the general index of wholesale prices has increased by about 100% and wages by about 85% between 1938 and 1947.

Retail food prices and rents are no guide to general economic conditions, as the former are partly subsidised by the Government and the latter are, in many cases, frozen at the pre-war levels.

The cost of fuel and light has increased by about 50% and the personal expenditure under this heading is now equal to £310 mill. per annum as compared with £197 mill. in 1938.

TABLE V
Prices and Wages

	1913	1938	1948
Wholesale prices : Board of Trade index numbers :			
General	60	72.6	155
Food	60	74.1	135
Materials, &c.	60	72.1	165
Retail prices : Ministry of Labour indices :			
Cost of living	57	89	116
Food	59	82	98.5
Rent	68	109	114
Fuel and light	—	98	155
Personal expenditure on fuel and light (mill. £)		197	310
Wages index	53	104	191

THE INDIVIDUAL IN A NATIONALISED GAS INDUSTRY*

By J. H. CORNISH, Jr.,
Bridgwater

The author maintains that a great need of the moment is to inculcate in the mind of every worker in the gas industry that he is making a contribution towards the comfort and well-being of the community—that he is in fact engaged on work of national importance.

IN looking to the future it will probably be true to say that the most important gas load will continue to be the domestic one, and any tendency for consumers to adopt other fuels, either as the result of propaganda or because of poor service on our part, will, of course, react detrimentally to us. Thanks largely to the work of London committees and district domestic development committees, local housing authorities have up to now, generally speaking, given gas every chance in new housing estates. We are told, however, that with the new electricity generating plants now being built we have, say, three or four years to put our house in order to meet threatened intensified competition. This may be so, but if uncontrolled sales of electric heating appliances are allowed to continue, or are encouraged as they have been in some instances over the last year or two without consideration of overall load factor or maximum demand, it will still be necessary to have power cuts, load shedding, &c., and the position in general will remain much as it is to-day, with consequent dissatisfaction to the public.

Now that gas and electricity are both owned by the nation, is it too much to hope that the inherent weakness of electricity supply—*viz.*, lack of storage and consequent inability economically to cater for large peak demands—may be recognised, and a policy adopted which will help national coal economy, and not just pay lip service to it?

If the gas industry is to progress still further, whether or not the intensified competition becomes a reality, it must remain a strong industry. A strong industry requires a strong personnel, and this is built up not by chance, but by careful selection, systematic and thorough training, opportunity to develop enterprise and self reliance, and, by no means least, the assurance of adequate remuneration. Insistence upon a high standard has its effect on the reputation of an industry and tends to attract the interest of ambitious young men of the right type who are seeking a career.

Need for Propaganda

When considering personnel, one's thoughts are inevitably led towards the supply of labour, and here, I think, there is opportunity for the nationalised industry to advertise itself. At present I do not think that gasworks service is sought after, the old arguments of constant employment and a steady job do not carry as much weight as they did in pre-war years, and in this part of the country at any rate, it is extremely difficult to maintain an adequate labour force. One reason is the generally cleaner and less vigorous work that is offered in the newer types of factory which have come into the district. To meet competition for labour, there should be a long term advertising campaign somewhat similar to that which has been in use to recruit labour for the coal mines. The coal mines have been able to state that men will be trained for a specialised job, but there are plenty of specialised jobs in gasworks, and some regional organisation for training men would, in my opinion, be of benefit in popularising employment in the gas industry as well as in producing more efficient labour.

The record of performance of the gas industry in service to the public is so good that it is taken for granted, and only a major breakdown of gas supplies would make it evident that unfailing service cannot be produced indefinitely without good workmen (and ample plant). Appropriate advertising would create the feeling that a gasworker is doing a national—as distinct from a nationalised—job. Nationalisation of the gas industry has been in operation for three months. The industry which has been nationalised is over 125 years old, from which fact one can draw at least two conclusions—either that the industry is so old as to be effete or, and this is obviously the correct one, that the 'nationalisers' have acquired on very favourable terms an industry which has not only over 125 years of goodwill, but also the traditions of loyal service by those who have from day to day managed the industry and collectively brought it to such a pitch that it has unprecedented loads, and this in spite of the ravages of the war years.

Co-operation Must be Fostered

The new arrangements have not yet had time to settle down, and it would be unfair at this early stage to offer anything but constructive criticism. One of the objects of the gas consultative councils is, I believe, to have means of explaining readily the plans, aspirations, and difficulties, of which there will surely be many, of the area Boards to the representatives on the councils. These in turn will pass on this information to those they represent. This seems to be a wise provision, and as a corollary it is to be hoped that those who in their individual capacities have to translate into actuality the plans of the area Boards will be given as much insight as possible into the overall plan formulated. Knowing what is being done, and having an object in view, unquestionably helps to inspire willing service. The area Boards have taken over not only the material assets of the gas industry, but also a vast amount of goodwill and the spirit of co-operation among the officers and staff of every

* From an Address as Chairman to the Southern Association of Gas Engineers and Managers (Western District), Exeter, July 21, 1949.

undertaking. This spirit of co-operation should be fostered and increased by every means possible.

A talk on administration given some two years ago concluded with these words: 'Conduct in the realm of management should be founded on the realisation that all with whom you deal are human beings. While the mechanics of an enterprise can be developed on lines proved by experience, the problem of human relationship is transcendent.' I think that statement is very appropriate to-day.

I would quote the words of Sir Edgar Sylvester at the recent meeting of the Institution of Gas Engineers:—'We must look after the individual in so far as we give him opportunities for initiative, we must make conditions of work in the gas industry sufficiently attractive to induce a steady supply of well trained recruits to enter the industry.' Again quoting Mr. Sylvester, 'Every individual in the industry therefore, whatever his job, should be conscious that he is engaged on work of national importance, and that he is making a contribution towards the comfort and well being of the whole community.' I should like to lay stress on the words *whatever his job*, because I think this wants taking literally. Somehow or other this idea of national importance and service to the community requires to be inculcated in the minds of the present generation of workers. I refer particularly to the manual worker. The older men in the industry, and very many of the staff, hold the idea to a large extent, and generally speaking would go a long way and make sacrifices, if necessary, to ensure the well-being and reputation of the industry. The younger working men do not seem to have that feeling; and unless something can be done about it, I am fearful that in a comparatively short while troubles which ought to be settled easily and co-operatively may become the excuses for more widespread unrest. Whether this unrest be official or unofficial the result will be harmful to all concerned. I therefore reiterate the plea for national advertising of service in the gas industry.

It must also be remembered that, with a nationalised industry, immediately any sort of dispute becomes such that ordinary negotiating machinery cannot settle it, there is no longer, broadly speaking, a national body in the background which can mediate, because the State itself is no longer in the old position of holding the ring between capital and labour. The State itself has become the employer. The reference by Mr. Edward Crowther in his Presidential Address to the I.G.E. to the fact that the Heyworth report expected a 20% expansion in gas sales in 10 years, whereas in the first four years of the period an expansion of 22½% has already been recorded, coupled with his remarks on seasonal peak loads which are bound to increase as space heating business is taken by gas, and his analyses of capital costs per ton for new construction, points the direction in which some of the serious problems of gas supply lie. His comments emphasise the need for decisions to be made quickly, though with careful consideration—two conditions obviously difficult to reconcile. The problem in a scattered district such as this becomes intensified, and this means that its solution should be accelerated if the good name of the gas industry is to be maintained. I feel that the South Western Gas Board has some difficult problems to solve, but I have no doubt that they will be solved in all areas given time and money. The time factor should be well covered under nationalisation if there is any truth in the statement that 'the nearest approach to immortality on earth is a Government Department.' As for money, a cynic has said that in a state of planned economy 'everything is included in the plans except economy.'

NATIONALISATION AND THE JUNIORS

J. W. DENTON, G.M., M.Inst.Gas E., A.M.I.Mech.E., M.Inst.F., Torquay Gas Undertaking.

The following are extracts from the author's address as President of the Western Junior Gas Association. In common with the practice adopted by the London Juniors, the address, coming at the end of the session, gives the President a chance of surveying the activities of the session. For this reason, perhaps, Mr. Denton's comments were largely complimentary to those who had given papers during the period. This procedure is judicial. We ourselves prefer the opinion of leading counsel. Fortunately, in spite of this retrospective and self-imposed handicap, Mr. Denton has his own views.

ONE advantage of nationalisation will be the degree of integration thus afforded, but this does not necessarily mean the building up of inordinately large carbonising plants interconnected by high pressure mains. I think it will generally be recognised that while, to obtain by their diversity of supply a reasonable load factor, super power stations for the generation of electricity are desirable, the same does not apply to carbonising plants because of the relative ease by which gas may be stored to meet fluctuating loads. On the other hand it could be argued that the distribution of gas through long pipelines involves a capital and transmission cost which would not compare favourably with corresponding charges in respect of electrical high tension transmission. If this were not so, all coal would be distilled or carbonised at the pithead and the resultant gaseous and solid products distributed as required.

There is, of course, an upper and a lower limit, which, according to local circumstances, governs the size and disposition of carbonising plant. Since coal is normally brought to the retort house supplying the district, it may generally be transported to one or more retort houses in the vicinity at the same price providing facilities for handling are similar. It remains then to provide a carbonising unit with coal and coke handling facilities capable of economical output at the most convenient point for the distribution of gas, particularly as there is no evidence to suggest that the efficiency of carbonisation can be obtained only by mass operation. It is generally accepted that plants carbonising 100 to 300 tons per day offer all facilities for economical working; and reasonable dispersal of gas-making plant has the advantage of providing for a similar dispersal of coke for use in the domestic and industrial markets.

A consideration of the distribution costs in transporting or supplying gas at distances from the works, while not precluding distribution by pumping over distances of some miles, shows that there is need to consider the point when high distribution costs outweigh any advantages which might be gained by centralisation of the carbonising unit. Most manufacturing stations of the size indicated are working at high efficiency, and, indeed, the gas industry has reason to be proud of the use it makes of coal. It is not by greatly increased efficiency in carbonisation that we operative technicians can effect economies, as normally this is obtained by the introduction of new or improved carbonising systems developed by research. It will, however, be possible by integration to improve power factors of processes and utilisation of plant, and we shall be expected to apply ourselves to problems in this connection.

Integration will increase the importance of maximum usage of available equipment so as to obtain an improvement in the overall utilisation factor. We shall find it necessary to look into the amount of plant which is standing either idle or under repair and we shall need to correlate this information with that appertaining to adjacent works with a view to reducing redundancy of standby plant.

Carburetted Water Gas Production

A survey of power factor and plant utilisation should include consideration of the advantages which may accrue by the use of blue gas or carburetted water gas as a means of meeting seasonal peak loads or sudden demands. An investigation at Torquay has assured us that the right use of carburetted water gas is an economic proposition irrespective of the fact that water gas production can be employed to deal with a surplus of coke. There are different peak loads incident in a works, and in the Torquay area we have to face regular seasonal peaks which can generally be predicted, but in particular a very heavy peak load in the winter which occurs invariably between December and March and is of only about a fortnight's duration. In addition we have smaller peak loads which, with restricted storage, can be embarrassing even if they are only daily peaks occasioned by a Regatta or a particular Bank Holiday.

By analysis of the records of previous gas consumptions in relation to temperature and weather conditions it is possible in large measure to predict the base load consumption, but no estimation can be made of peaks due to freak weather or a sudden influx of visitors occasioned by conditions not easily foreseen. It is either necessary to have sufficient plant standing under fire to meet these loads or carburetted water gas must be employed for topping up.

Even to meet predictable peak loads of short duration it is considered uneconomical to raise heats in a setting with the object of carbonising coal in that setting for the period necessary.

Base Load Plant

Over-riding these operational difficulties and high operative costs is the comparatively heavy capital cost of standby equipment for coal gas carbonisation. As we are located a consider-

able distance from a coalfield, transport charges contribute in a large measure to the coal costs. This factor naturally influences our choice of coal; and with this in mind we have installed as a base load plant continuous vertical retorts. This type of plant makes gas in an environment pleasant and healthy for the operatives and produces a coke which is clean and well suited for domestic consumption. We consider this the ideal base load plant; but for loads incident only for a short while it is uneconomical to keep a large installation, or large sections of such an installation, standing either under heat or even cold to meet peak demands.

The works site at Torquay is small for the output expected and consequently we place some value on ground space, but apart from this the capital cost per million employed in standby plant is reduced considerably if that standby plant is for the production of carburetted water gas for topping up.

For some time it cannot be expected that conditions appertaining at manufacturing stations will be perfect; they will be a compromise between what is ideal and what is practicable; and as steps are taken to co-ordinate policy there will be much to commend the use in a district of base load coal gas plant from which gas is distributed to outlying district holders, at which holder stations are sited standby C.W.G. plants which could be brought into operation to meet peak load conditions. In this way, peak loading on interconnecting transmission mains would be reduced. By the operation of C.W.G. plants, problems often presented by distribution and storage of coke would be eliminated.

Distribution and Storage Power Factor

It is, however, in distribution that we shall more readily be able to obtain results by applying the economics dictated by the principle of ensuring a good load curve. It is now almost generally accepted that district storage of gas is a necessary adjunct to efficient transmission and distribution, increasing as it does the power factor of the distribution systems by utilising the transmission mains throughout the 24 hours. Indeed, it may be possible to use low pressure distribution mains to pass gas to district holders at off-peak or night hours by the application of inlet boosters to holders entailing the use of very small power units to effect the small pressure increase necessary for the operation.

The provision of works storage holders with capacity of the daily maximum make is no longer essential. It may be desirable, but the high capital cost involved in providing this safety factor cannot be regarded as being in line with the modern need for the utmost economy in the use of existing equipment and available capital. Compressors could distribute gas through constant volume governors into distant holders disposed at convenient points in the low pressure supply network and compressing plants at the manufacturing station could, to a large extent, have a constant hourly output.

With these conditions obtaining a manufacturing station will need to have only sufficient holder capacity to deal with its immediately adjacent low pressure system and to provide sufficient buffer storage to meet fluctuations or breakdowns which cannot be predicted. On the district the holder will need to be equipped with boosters, automatic for preference, so that a constant pressure can be supplied to the inlet of the station governors irrespective of the position of the holder lifts.

If hourly issues are plotted they are invariably found to have a definite characteristic curve. This curve is dictated by the type of district served and the sales policy of the undertaking. Assuming gas is being supplied to the holder at a constant volume throughout 24 hours it is possible to graph the holder stock at any hour of the day under normal conditions of input and output.

Under these conditions, and using issues characteristic of the Torquay area, a holder will deal with 24 hour issues three times the capacity of the holder, and, even so, this will allow one-third of the holder capacity for a marginal safety. This scheme of operation involves the use of boosting plant to give adequate pressures at inlet of station governors when pressures are reduced by uncupping, and the horse-power necessary for this work is relatively small.

Accordingly, in arranging integration and knowing the issue characteristics of the district over 24 hours it is possible to determine the rate of input, size of holder, and size of boosting plant necessary to maintain any pressure conditions at outlet of holder. Each area will have its own issue characteristics, or each area, by a centralised sales policy, will have the characteristics of the parent district imposed upon it so that it will be possible to determine exactly the relationship between input, size of holder, and issue, and to estimate in developing an area, the combination of holder storage and rates of input and output.

As we press forward with a sales policy which has in view the smoothing out of the district load curve, to a large measure existing holders will be able to deal with greatly enhanced consumptions.

Holder Power Factor

A graph setting out gas issues and actual holder stocks based on the assumption that the input is constant throughout the 24 hours produces some very interesting results regarding storage power factor. A definition of the holder or storage power factor might be given as the value of the constant hourly input divided by the maximum stock which it is necessary to provide in the holder to ensure continuity of supply. I think it is generally accepted in our industry that the distribution power factor is the average issue (*i.e.*, the daily issue divided by 24) divided by the maximum hour. It will therefore be seen that the maximum stock bears the same relationship to the maximum hourly issue as the distribution power factor does to the storage power factor.

This relationship is important and cannot too strongly be emphasised; and we juniors must explore every avenue in an attempt to improve both these factors as they are a key to consumers' costs. A few simple graphs of conditions applying to your particular undertaking, when analysed, will afford interesting data and no doubt lead to improvements. The field, however, is much wider than this. There are many other ways in which we can apply our energy and technical knowledge to exploration of economies that can be effected.

Working Conditions

So far I have confined my remarks to the implications of plant usage, but we must realise that co-operation of the plant operatives is an equally important factor. The management can be assured of the operatives' co-operation by a study of their working conditions and general environment, and every reasonable device to effect improvements should be employed. Suggestions from employees should be encouraged and given every consideration.

In Torquay we have attempted to make conditions at the manufacturing station, distribution depôts, and showrooms pleasant and attractive. Particularly have we given thought to the working conditions of those whose duties are carried out where conditions, if not controlled, might make work uncomfortable or even intolerable.

Industrial environment has been the subject of much research during recent years, due in large measure to increased mechanisation in the factories and the importance of maintaining high production rates. Broadly speaking, however, the cardinal points are safety and improved working conditions for the workmen. Careful adherence to the requirements of the Factory Act is, of course, essential. Alas, it is possible to interpret these requirements generously. Electrical plant should be maintained in first class condition and particular attention given to protection from electric shock by the use of a low voltage supply for portable tools and handlamps.

We are in the ambiguous position of having no clear definition as to when we should use flameproof electrical equipment, though we have the responsibility of ensuring that the correct type of equipment is installed. Precautions must, of course, be taken against the risk of damage by explosion wherever explosive gases are prevalent. This condition may be almost anywhere within the works, but disposal of these gases by adequate ventilation considerably reduces the risk. It follows, therefore, that greater precautions should be taken in an enclosed booster house or benzole plant, which may be unattended, than in say a retort house, which is a comparatively large building with free ventilation and with operatives in constant attendance. Resuscitation apparatus must be available to treat collapse occasioned by gassing and it cannot too strongly be emphasised that this method of treatment should be used rather than the now obsolete method of 'walking the man about' with the accompanying strain on the victim.

To provide better working conditions every device should be considered and, where practicable, utilised. Cold air douche or air conditioning should be applied and dust collection carried out to prevent deleterious conditions arising.

Vacuum cleaning of the staging in retort houses and water gas plants may to some appear extravagant, but the degree of cleanliness obtained by collecting dust in contrast to dissipating it by sweeping is considerable. Furthermore, freedom from dust is highly desirable in parts of the plants where high-speed bearings are employed or equipment which is not totally enclosed is operated. Facilities for changing and storing clothing, storage and drying of working clothing, and for washing must be provided.

The Junior Associations

The Junior Associations have been supported by the industry. They are not independent. Facilities have been given for the juniors to travel and, in most cases, expenses have been met by constituent undertakings. If this is to continue it will be regarded that the Junior Associations must serve more than one purpose. They will still provide a platform to allow free expression of opinion, but, on the other hand, it can easily be visualised that the administration of the area might well require the junior association concerned to discuss or explore a specific problem peculiar to that area. This two-fold object of an association necessarily encloses the association in boundaries which conform to the area Board; and I feel that the sooner we realise this the smoother will be our relationship with the area Boards. It will also be

highly desirable, in my opinion, to make ourselves part of the Institution of Gas Engineers as a Junior District Association on lines similar to other chartered engineering bodies. In this way we shall be able to discuss problems which have been presented to the Institution at district meetings, and a close liaison will be effected between research and practical application. Constituted in this manner the associations may help considerably to build up area education schemes and transfers during training.

Our own Association is composed largely of young technicians with a forward outlook; and I believe that there will be no falling off in enthusiasm by a mistaken conception that now we are nationalised we shall be regimented into groups with automatic promotion. Whatever may be our personal views concerning nationalisation there is not one of us who will not continue to give the best of his brains and his physical endeavours to his own particular duties and thereby make his due contribution to the success of the scheme. Competition will be greater. Managements responsible for appointments and promotions will now have a wider field from which to select their men, and they may in time become persuaded that a previously accepted standard of efficiency in a particular post should be raised. This may apply to all grades of employees and affect minimum standards on posts held currently, as well as assessment of candidates for promotion. It behoves every one of us to do his best.

A REVIEW OF CARBONISING*

By M. SINCLAIR GASKILL, M.INST.GAS E.,
West's Gas Improvement Company, Ltd.

AS a starting point for a review of the development of half a century it is essential that in the first place one should consider the position of the industry at the commencement of this period—that is, in 1898. The year 1898 was in fact the centenary of the first practical application of gas manufacture, since it was in 1798 that Murdoch installed equipment for lighting with gas the works of Boulton and Watt at Soho, Birmingham. The carbonisation of coal to obtain coke had been practised for many years prior to this time, a patent having been granted to Hugh Grundie in 1620. By this the patentee was given 'the sole right for 21 years to charke coal being an invention never heretofore putt in use or brought to perfection until the same was donne by the said Hugh Grundie.' He was also granted the sole right to use the fuel so obtained for casting and refining iron.

In 1636 Thomas Peyton, of Deptford, patented 'a perfect way of charking seacoles for that they burn without smoake, or other annoyance, and very good for chamber fires and for the faire and sweete drying of malte and hoppes approved as well by the Brewers of our cities of London and Westminster and by the inhabitants of the maretyme Townes upon our seacoasts from Newcastle to Dover.'

No details are available of these patents, and it is probable that the means adopted followed closely the usual practice for charcoal burning.

In succeeding years considerable developments had occurred, and by 1898 the amount of coal carbonised for the manufacture of gas was 12¼ mill. tons and there were 656 gas undertakings in operation. During this period the use of refractory materials for the manufacture of retorts had completely superseded that of cast iron and the horizontal retort bench had developed into a design in many respects similar to that of the present day. This was in a great measure due to the general adoption of gaseous firing in the place of the older system of direct firing of the retorts. With reference to this development, Dr. C. C. Carpenter, in a paper given to the Southern District Association in 1897, stated 'the day is probably not far distant when the direct firing of gas retorts will have been wholly abandoned except in the very smallest works.' There is no doubt that the system of heating by producer gas made possible much of the development in carbonising plant design not only at this time but at a later period when the vertical retort was introduced. It is perhaps not generally known that Murdoch conceived the idea of using a vertical retort but abandoned it in favour of the horizontal retort on account of the difficulty of heating the former by direct firing.

Stoking Machines

By the year 1898 machinery for charging and discharging retorts had also come into general use, it being estimated that about 25% of the carbonising plant in this country was provided with some form of machinery, although much of such equipment was manually operated.

The advantage of machinery from the labour point of view was expressed at this time in a somewhat striking manner by the gas engineer of Vienna who, speaking of the results of installing charging machines on his works, said: 'In place of an army of Powerful and tough Bohemian stokers imbued with the barbarous and fanatical manners of their Hussite ancestors there are now a few intelligent workmen.'

Very little attention appears to have been given to the possibility of improved results of gas making other than the reduction of labour costs. This was undoubtedly the main object in view in the development and installing of machinery, and in the presidential address to the Institute of Gas Engineers in 1897 it was stated that, 'bearing in mind to what a low cost the labour in the retort house has been reduced by the work of Mr. Foulis, Mr. West, and others, the margin for further saving is but small.

There were, however, other competitors in the field. A company known as the London Portable Gas Company were supplying gas made from oil and claimed that more than 10,000 cylinders of this gas were in use in London.

The use of acetylene was being actively developed, the technical Press of the time described numerous methods and patents for its manufacture and use. In fact, it is surprising to note the considerable ingenuity and the number of ways in which it was proposed to carry out the apparently simple process of adding water to calcium carbide.

There were also a number of proposals for manufacturing gas without the use of coal. One of these processes, reminiscent of a cooking recipe, employed the following ingredients: 1 pint kerosene, about 2 oz. powdered resin, a certain proportion of shale oil, about 1 oz. salt, ½ oz. ether, a few drops of bisulphate of carbon, ½ gal& gasoline, a little camphorated chalk, a small dose of oil of cloves.

The method of dealing with this surprising mixture was not clear, but the inventor claimed that the gas could be sold at a cost of 1s. per 1,000 cu.ft. and prophesied that 'coal gas was doomed.'

Inclines

A more serious rival to the machine stoked horizontal retort was the inclined retort, of which the first installation in England was constructed at the Southall Works of the Brentford Gas Company in 1889. Between the protagonists of the two systems —*i.e.*, horizontals or inclines—a long and at times heated controversy raged as to their relative merits.

In a paper to the 'Society of Engineers' the author wrote: 'At the present time there are hundreds of gasworks with stoking machinery, the perfection of which leaves scarcely any room for economy by the more recent invention of the inclined retort.' On the other hand a supporter of the inclined system wrote even more emphatically, 'comparing the inclined system with power stoking everything including commonsense points in favour of the former plan. Power stoking is a costly Colossus turning an otherwise decent looking retort house into something between a pit-head and a machine shop.' In view of the foregoing brief extracts it is not surprising that an American engineer after visiting this country reported that 'the question of inclined retorts and mechanical charging is being fought out. The results given by the advocates of the two systems are so contradictory that it is exceedingly difficult to draw any safe conclusion.' Perhaps the best conclusion was expressed by the late Mr. John West when, after listening to a long discussion between the advocates of the respective systems, he said: 'Everybody appeared to be so satisfied with what he was using that it seemed a most pleasant position for those present to listen to them . . . He thought inclined retorts *might* go on but he did not believe the horizontal would be knocked out any more than electricity would knock out gas.'

Time has proved he was right, and while inclined retorts continued to be installed and operated for many years the difficulties experienced, unless carefully selected coals were carbonised, led to their eventual abandonment.

Carburetted Water Gas

Before leaving this brief survey of conditions at the beginning of the period under review, two further points call for mention.

It was at about this period that the manufacture of carburetted water gas came into general use. Up to this time the desired candle power of the gas had been obtained by the use of cannel. This was in many cases being superseded by the carburetting of water gas with oil and this appears to have been the principal reason for the installation of water gas generators rather than its use as 'peak load' plant which was to develop at a later date. In 1897 over 48 mill. gal. of oil were used by the gas industry as a result of which the price of Wigan cannel fell from 41s. to 23s.

*A Paper to the Manchester and District Junior Association of Gas Engineers

per ton. Most of this oil came from Russia, although it is reported that in 1895 'Manchester recently bought a cargo of American oil which it is enabled, since the opening of the Ship Canal, to bring directly to that city.'

Waste-heat recovery was also attempted for the first time. At Sunderland the waste gases from direct fired horizontal settings were passed through Lancashire boilers and it was claimed that a reduction of 700° F. was obtained in the temperature of the waste gas, steam being generated at a pressure of 32 lb./sq. in.

As a footnote to the year 1898, which may give some comfort to those junior members of the Association who have recently sat for the examinations of the Institute, the examiner of the City and Guilds, in his report on the papers submitted by the students of gas engineering, complained that the sketches were poor.

Recent Times

Turning to the position of the gas industry in more recent times, according to the returns of the Ministry of Fuel and Power, there were in 1947 a total of 1,038 gas undertakings in Great Britain carbonising 22,470,000 tons of coal per annum. Approximately 52% of this coal was carbonised in continuous vertical retort installations, 38% in horizontal retorts, 8% in intermittent vertical retorts, chambers, &c., and 2% in coke ovens.

It is therefore of interest to examine the records of development of carbonisation in the intervening period with a view to obtaining an appreciation of the reasons for the trend of development. Furthermore, such a review may well form a basis for an examination of the possible future development of carbonising equipment in this country.

Although the history of the gas industry is a record of increasing development, probably at no time during its history has the pace of such development been greater than during the decade from 1904-14. This was emphasised in the report of the Carbonising Committee of the Institution of Gas Engineers in their report for 1909, as follows:

> 'After a hundred years of steady and consequently rather slow progress by means of evolution, the gas industry has entered a new era. The commencement of the second century of its existence has been heralded in by some revolutionary changes, more especially as regards methods of gas production. Developments during the last five years or so assumed so rapid a pace and are of so varied a character that it renders the task of picturing the state of advance at any given moment an extremely difficult and delicate one.'

The Vertical Retort

The 'revolutionary changes' in methods of gas production referred to were the development of systems of carbonisation in vertical retorts.

The idea of letting gravity do the work was of course by no means new. As already stated, Murdoch had originally proposed to employ a vertical carbonising vessel, and a number of later experimenters had from time to time attempted to follow this system. In fact, as early as 1828 John Brunton invented an intermittent vertical retort, and about 30 years later Rowan patented a semi-intermittent retort in which the coke was removed at intervals through a water seal at the bottom of the retort.

It was not, however, until the early years of this century that the system took a practical form. There were a number of factors which brought about this rapid and successful development at this time. First, the invention of the incandescent mantle and even more the increasing use of gas for heating both in domestic and industrial spheres focused attention upon the calorific value of gas as opposed to the illuminating power which had so far been the standard of valuation. Secondly, the increasing cost of coal and of wages turned the attention of gas engineers to systems which promised the maximum gaseous yield from their coal with the lowest operating costs. Moreover, the general adoption of gaseous firing in place of direct firing overcame one of the greatest difficulties of the earlier designers, namely, the problem of heating a vertical retort.

The Calorific Standard

The adoption of calorific value of gas instead of candle power as the standard of quality was urged by Dr. H. G. Colman in a paper to the Institution of Gas Engineers in 1900 on the basis that 'a large and constantly increasing proportion of gas is employed for purposes in which the calorific power is of greater importance than the illumination power.' In this paper Dr. Colman described the Junkers calorimeter which was the first practical instrument for this purpose, although a 'gas' calorimeter was invented by a Mr. F. W. Hartley in 1884.

It is interesting to note that while the intermittent vertical retort was introduced into this country from the Continent, particularly from Germany where it was already firmly established by 1909, in Great Britain development was concentrated mainly on the continuous principle. This point was dealt with in the following extract from the report of the Institution previously quoted:

> 'From the higher building record which the German pattern of vertical retort has attained it must by no means be inferred that sufficient attention has not been paid to the problem in this country. One of the causes of the slower progress is rather to be sought in the more ambitious task that English engineers have set themselves by making continuity of feed and discharge a principal feature of their various designs. Considering all the factors involved and in view of the wider experience gained it must be admitted that this principle is not only a perfectly sound one, but appears to be preferable to that of an intermittently charged and completely discharged retort both from theoretical and economic considerations.'

1910

The above remarks were followed up in the 1910 report of the same Committee (Carbonising Committee of the Institution of Gas Engineers) when it was stated: 'Continuous vertical retorts have been somewhat neglected on the Continent. Engineers appear, however, to regard this product of purely British thought with less and less suspicion and begin to realise that the system has successfully emerged from its experimental stages.'

In this connection it is interesting to note the German point of view as recorded by Dr. Bueb in a paper to the German Gas and Water Engineers in September, 1906. 'Their English colleagues desired not merely to carbonise their coal in vertical retorts but simultaneously to elaborate a continuous process. The path before them, however, was extraordinarily tedious and difficult. From many years experience they at Dessau knew how almost always success in one direction was accompanied by failure in another. Nearly always when some device had been introduced which was an improvement in one respect an undesired and unforeseen defect cropped up and had to be overcome. Six years' work with the vertical retort had thoroughly convinced them that only by orderly methods of progression could the problems that still awaited solution be solved efficiently.'

Time has proved that Dr. Bueb's implied pessimism with regard to continuous vertical retorts was not justified. Anyone, however, who has been concerned with development will be in heartfelt agreement with him on the frequency with which the undesired and unforeseen does occur, and every credit is due to the pioneers who in spite of the many difficulties and problems were instrumental in the successful development of continuous carbonisation.

One of the main reasons for the general adoption of the intermittent retort in Germany was undoubtedly the domestic coke market. The general use in that country of comparatively small slow combustion stoves designed for use with coal or dense coke called for the continued supply of such coke. The employment of this type of stove in this country was very limited, and in the early days, at least, of the continuous retort the high reactivity of the coke produced was considered a definite advantage.

Dr. Bueb's system or, as it is better known, the Dessau intermittent vertical, was first patented in England in 1902. It was originally in many ways similar to Brunton's design but the gas offtake was arranged on the side of the retort. This arrangement was modified to a top offtake some two years later and a further modification about 1909 embodied the construction of the retorts in units of three which were discharged and subsequently charged together, a common gas offtake for the three retorts being provided.

The Continuous Vertical

It was also in 1902 that Settle and Padfield introduced a vertical retort into the top of which coal was fed continuously. The coke was removed manually from the base of the retort at intervals. The operations were regulated so that an empty space was maintained at the top of the retort to act as a cracking chamber. The first retort which can correctly be described as continuous was developed in 1905 by Woodall and Duckham. In its early stage the coke was removed through a water seal as in Rowan's process, but continuously by mechanical means; but this method was changed by 1908 to a discharger similar to the well-known present-day system. Although the system which was eventually to be known as the Glover-West had been used for a number of years for the distillation of shale it was not until 1905 that Young, in collaboration with Samuel Glover, of St. Helens, adapted this method to the carbonisation of coal. In this system both the withdrawal of the coke and the admission of the coal were effected mechanically. By this means a space was maintained at the top of the retort for cracking purposes. The retorts were heated by a series of horizontally disposed chambers, basically the same system as in use today.

The mechanical coal feed and the free space were soon to be abandoned and the original coke extractor by which the coke from four retorts was delivered into a common coke chamber was superseded by the 'worm.'

Development was indeed rapid in these early days, for by 1909 installations of both Woodall-Duckham and Glover-West systems were operating commercially and successfully.

Other Systems

In addition to these systems already mentioned a number of other designs for vertical retorts both intermittent and continuous were introduced, including those of W. R. Herring, of Edinburgh.

Alexander Wilson at Glasgow, and at a somewhat later date the Drakes continuous system and the Jenkins intermittent.

It was at this time that Wilson constructed a vertical retort in which the whole of the taper was embodied in the upper section, the walls of the lower part of the retort being parallel.

In the field of the horizontal retort there was also at this time considerable development. The advantages to be gained by heavy charges had been demonstrated by a number of investigators and the introduction of the projector type of charger had made possible this method of working. An interesting plant which, however, was not followed up, was constructed and successfully operated by Thomas Glover at Norwich. It consists of 'chamber horizontal retorts' the dimensions of which were 36 in. high, 12-13 in. wide, and 21 ft. long. These retorts were charged by a modified form of De Brouwer projector. Chamber ovens both inclined and horizontal had been in use for some time in Continental gasworks, but in most cases these chambers were much larger than the Norwich type.

In 1909 the first commercial scale low-temperature plant for production of smokeless fuel, by the Coalite process, was installed at Plymouth.

A development in the heating of setting other than those incorporated in the various systems mentioned was the introduction of mechanical producers in gasworks. The first installation of this type was constructed at Vienna in 1910 in conjunction with a battery of chamber ovens. I am not unmindful of the further advance made by the introduction of steaming in about 1918, made practicable as it was by the adoption of the calorific standard.

The foregoing brief account of developments during this period could be considerably extended, but enough has been said to show the rate of this development which could in many cases be described as revolutionary. It is believed that it will be generally agreed that there has been no period in the subsequent history of carbonisation which can be considered comparable. It is not suggested that there has been no development in the ensuing years; there has, of course, been an enormous amount of research and development carried out, but this has been of an evolutionary nature and has to a large extent at least in its practical application a question of details rather than of basic principles.

Choice of System

I do not propose to attempt to describe the developments in the various carbonising systems. Such developments are well known, and even to deal with them in outline would result in a paper of inordinate length. It is believed that enough evidence has been advanced to show that the gas engineer, who since, say, 1912 has been responsible for a decision on the type of carbonising plant to install, has had the possibility of choosing between a number of systems of a widely varying type each of which had particular advantages. We see in the structure of the industry today the result of the decisions which have been made, and it is of value to examine as far as possible the factors underlying these decisions.

The main factors involved may be summarised as follows:—

1. Cost of gas production. Related to this factor is the thermal efficiency of the system, although it must be realised that the most thermally efficient plant is not always necessarily the most economic.
2. Area available in relation to output of gas required.
3. Site of works and nature of surroundings.
4. Labour conditions.
5. Type of fuel available.

Having stated at least some of the relevant factors I am conscious that any attempt to enlarge upon them may involve me in a sea of controversy. Throughout this paper I have purposely avoided quoting costs partly since, owing to the great changes in money values that have occurred, such figures may have little meaning, and partly because it is extremely difficult to obtain truly comparative results or figures.

Coke Ovens

There is, however, one gas undertaking in this country, the Gas Light and Coke Company, which has had a wide experience of practically all types of carbonising plant, and I propose to refer briefly to three papers given by officials of that Company. While two of these papers, 'Functions of Coke Ovens,' by E. G. Stewart (Trans. Inst. of Gas Engineers, 1929-30), and 'The Coke Oven Plant at Beckton,' by R. W. Hunter (Trans. Inst. of Gas Engineers, 1932-33), deal primarily with coke ovens, in both papers valuable comparisons with other types of carbonising plant are given.

The third paper, 'Fuel Requirements of Carbonising Plants,' by Dr. Pexton (London and Southern District Junior Gas Association, 1943), a careful study of which I would suggest to every student, contains many valuable data on the thermal efficiencies of carbonising systems.

To quote extensively from the foregoing papers is not possible, and I have, therefore, limited myself to a brief statement of the conclusions reached by Mr. Stewart and Mr. Hunter with the suggestion that they are typical of the reasons on which many engineers made their decisions with regard to the type of plant to be installed.

Mr. Stewart in his paper gives the net result of the comparison showing gas-making costs as follows:—

	Per therm.
Coke ovens (1,000 tons coal per day)	1.804d.
Continuous verticals (696 tons coal per day)	1.815d.
Horizontals (480 tons coal per day)	2.099d.

In his conclusion he states: 'When the daily capacity of the installations are taken into account the continuous vertical retort is shown to be the cheapest gas-making proposition.

'To sum up, the oven as a works carbonising plant in this country:—

1. Would seem to be of interest to only the eight largest undertakings, and to have been rejected already by several of them.
2. Cannot compete with continuous vertical retorts unless of over 1,000 tons/day capacity.
3. Requires ground space greater than any existing gasworks carbonising plant.
4. Producers a coke which would need special care in marketing, especially if the undertaking produces coke of an entirely different character.'

Mr. R. W. Hunter gave the following figures for costs of gas-making:—

	Per therm.
Continuous verticals	1.634d.
Intermittent verticals	1.596d.
Coke ovens	1.669d.
Horizontals	1.840d.

In summing up, he wrote: 'From the data given the conclusion may be reached that for the purpose of gas manufacture coke ovens are not more likely to prove superior to certain other systems of carbonising unless specially favourable prices can be obtained for the types of coke produced.'

Fuel Efficiency

Dr. Pexton dealt with the same types of carbonising plant from the point of view of thermal efficiency. He showed that the heat required in therms per ton of coal carbonised was 24.4 for horizontals, 23.7 for intermittent verticals, 20.5 for coke ovens, and 14.1 for continuous verticals. Comparing the actual fuel consumption of the four systems and remembering that the continuous vertical had no heat recuperation or regeneration from the waste gas and that no allowance was made for steam generated by the use of these waste gases in waste-heat boilers, the figures obtained are as follows:—

	Fuel consumption dry coke 10% ash Percentage on coal carbonised
Coke ovens	10.8
Continuous verticals	11.1
Intermittent verticals	13.3
Horizontals	14-15

Dr. Pexton stated:—

'The most striking feature is the smaller amount of heat carried away by the crude coal gas and coke, leaving a vertical retort compared with static carbonisation. This enables the continuous vertical retort to achieve almost as low a fuel consumption as the coke oven without any heat recuperation or regeneration from the waste gases. Since the waste gases from a continuous vertical retort can then be readily applied to steam raising, the performance of the continuous vertical retort is remarkably good.'

Since the date of this paper improvements in design have further reduced the fuel consumption; while a combination of recuperation and steam raising or electricity generation by means of the gas turbine offer further possibilities for the employment of the heat in the waste gases.

This was foreseen by Dr. Pexton, who in the paper in question commented that, 'although the overall fuel economy is so favourable this system (*i.e.*, continuous vertical retorts) offers the greatest scope for further improvements.'

Urban Amenity

Turning to the question of the effect of the position of the works on the choice of carbonising plant, since in the past many gasworks were situated in the centre of towns or in close proximity to residential areas, it was essential that nuisance arising from the carbonising process should be a minimum. In this connection an extract may be sufficient from a paper in which Mr. Blundell, at that time Engineer at Carlisle, described his experience in 'Ten Years' Carbonising in Vertical Retorts' (Trans. Inst. Gas Engineers, 1932-33):—

> 'The benefits accruing from the suppression of the periodic emission within the city boundary of the clouds of smoke and steam incidental to the other methods of carbonisation can hardly be exaggerated.'

With reference to labour conditions, while a retort house cannot be considered an ideal place in which to work, the gas industry has, I believe, always been conscious of the necessity to improve working conditions, and the continuous vertical retort has always offered the best possibilities in this respect.

GAS FOR BOTTLE WASHING

A large steam boiler which served the needs of Messrs. Wholesale Wine Distributors in their premises in Wandsworth was in a critical condition. The Potterton engineer who was consulted on the matter suggested breaking down the system into separate units. Emergency measures were taken on those lines and the bottle washing plant was converted to direct heating with gas fired boilers. The main bottle washing machine is a Milner 'Hydro' having two large detergent tanks and capable of handling between 3,500 and 4,500 bottles per hour.

Two Potterton 'D' series six-section 'Rex' gas-fired water heaters, each having a rated output of 246 gals. per hour raised 80° were installed to serve the two tanks. Each tank was connected up independently, each boiler being equipped with thermostatic and clock control mechanism, thus allowing a variation in temperature and heating up period between the two tanks.

Large bore circulating pipes have been used to reduce frictional losses during the 'heating up' periods when the plant is operating on the gravity principle. The effective circulating pressure is further increased by setting up the boiler thermostats to a high figure, but when the stratification is broken on switching in the detergent pumps the temperature of the mixed detergent is at the correct working temperature.

The special injectors fitted in the return lines to each boiler are connected to the discharge lines from the detergent pumps. Thus, when the pumps are in operation the detergent at high pressure passes into the injector fittings and induces a much greater flow through the boilers and back into the tanks. The boiler thermostats are then set back to the desired working temperature as the differential between flow and return is reduced to a minimum.

A small gas-fired fully-automatic steam boiler has been installed to take care of the process steam requirements of the factory.

The installation of another bottle-washing plant to be operated in the same way by gas-fired boilers is proposed in the near future, and plans are in preparation for the installation of a larger type of gas boiler to operate the central heating system on the low pressure accelerated hot water principle.

The splitting up of the boiler plant into separate units is stated to have led to an economy in running costs in addition to saving on the capital expenditure which would have been necessary had a new steam boiler been used to meet all requirements. The direct circulation of the detergent through the boilers in itself prevents any formation of scale inside the boiler, and the small amount of sludge that accumulates in the course of time is very easily removed.

* * *

Simple standard electronic devices for the continuous control of production processes are described in a booklet, *Elcontrol Aids to Production*, published by **Elcontrol, Ltd.**, industrial electronic engineers, 28a, Tilehouse Street, Hitchin, Herts. Details are given of a variety of control units for use in repetition welding, automatic fuel cut-off on flame failure in gas and oil-fired furnaces, control of liquid levels, &c., which have been designed to reduce man hours, speed production and control quality. The range of products includes a micro-switch to start a comparatively large electrical load by means of a small actuating current, a weld timer, and photoswitches for automatic opening and closing of doors, protection of hand-operated machines, liquid level and flow indication.

FURTHER GAS VALUES

A sixth list of compensation values, issued by the Minister of Fuel on July 25, covers 60 stocks of 24 companies. It also contains stocks issued after Dec. 31, 1945, which, if issued with Ministerial sanction for certain purposes, are compensated at issue price. There is another category in which stocks issued after the first publication of the Gas Bill in October, 1947, are automatically compensated at issue price. The issue of these new valuations, involving an additional £4¼ mill., was followed closely by a fall in the market price of 3% British Gas Stock to 93¼. Stock and debenture holders thus face almost a 7% loss in capital, which in many cases wipes out the higher compensation value in relation to nominal value. Except where otherwise indicated. the securities in the following list are in units of £100.

Undertaker	Security	Compensation value
Aberdare & Aberaman	Orig. Ord. (£10)	£22/10/–
Do.	Addl. Ord. (£10) ...	£16/2/–
Altrincham	4% Red. Pref. (£10) ...	£10/2/9*†
Barnstaple	3½% Red. Deb. (since Dec. 31, 1945) ...	£106*
Barrow-upon-Humber	Ord. (£5, £3 10s. paid)	£2/5/–
Barton	5% Gtd. Pref. (£2) ...	£2/5/–
Do.	5% 1st Min. Pref. (£2) ...	£2/15/–
Do.	Orig. (£2) ...	£4/5/–
Do.	New Ord. (before Jan. 1, 1946) (£2) ...	£4/5/–
Do.	New Ord. (since Dec. 31, 1945) (£2) ...	£3*
Beccles	4% Deb. (£10)	£10/2/6*†
Brighton, Hove and Worthing	4% Perp. Deb.	£103
Do.	3½% Red. Deb. (before Jan. 1, 1946) ...	£100
Do.	6% 'B' Pref. Consol‡ ...	£133/10/–
Do.	4% Pref.‡ ...	£103
Do.	4% Red. Pref.‡	£102
Do.	6% Stand. Consol‡	£151
Do.	5% Stand. Consol§	£135
Commercial	3½% Red. Deb.	£102
Easingwold	Ord. (£5) ...	£8/15/–
Eastbourne	4% Perp. Deb.	£102
Do.	3¼% Red. Deb.	£102
Do.	3½% Red. Deb., 1970... ...	£100
East Grinstead ...	4% Deb. ...	£106
Do.	6% Pref. (£10)	£15
Do.	Consol Ord. ...	£140
Exeter	5% Perp. Deb.	£125
Do.	4% Perp. Deb.	£102
Do.	5% Red. Deb.	£104
Do.	5% Pref. (£25)	£28/10/–
Do.	5% New Pref. (£25) ...	£28/10/–
Do.	4% Pref. ...	£101
Exeter	Orig.	£210
Do.	New Ord. (£10)	£16
Hadleigh	5% Red. Deb.	£100/10/–
Do.	Ord. (£5) ...	£11/5/–
Hawkhurst	4½% Red. Mort. Deb. (£50) ...	£51/15/–
Do.	4½% Red. 2nd Mort. Deb. (£50) ...	£51/15/–
Do.	Orig. Ord. (£1)	22/–
Do.	Addl. Ord. (£1) ...	22/–
Leighton Buzzard ...	Consol. Ord. ...	£115
Malton	Orig. Ord. (£10)	£26
Measham	Ord. (£1) ...	20/–
Melbourne	Ord. (£10) ...	£18/10/–
Otley	4% Red. Deb.	£100
Do.	3½% Red. Deb.	£100/10/–
Do.	4½% Red. Pref.	£104
Do.	5% Stand. Ord.	£122/10/–
Prescot	6% Pref. (£1)...	26/8
Do.	5% 'C' Pref....	£112
Do.	4½% 'C' Pref., 1935... ...	£109
Do.	4½% 'C' Pref.	£109
Do.	4% 'C' Pref....	£101
Do.	Consol Ord. ...	£111/5/–
Do.	Consold. Ord.	22/3
St. Andrews... ...	Ord. (£1) ...	33/6
South Metropolitan	3½% Red. Deb.	£102/5/–
Woburn	Ord. (£10) ...	£24
Yeadon and Guiseley	Consol 'A' ...	£230
Do.	New 'B' ...	£165

* The value of these securities has been determined by reference to the price of issue in accordance with Section 25 (5) or 25 (6) of the Act, as the case may be. In addition, in certain cases the note immediately following applies.

† More than one value applies to securities of this class, by reference to Section 25 (7) of the Act. The average value in accordance with Section 25 (7) (b) is shown, and is applicable except where the issue price (Section 25 (7) (a)) determines the compensation value.

‡ The value of these unquoted securities has been determined in accordance with Sections 25 (10) and 26 (4) of the Act.

§ The value of these quoted securities is the value for the purposes of Section 25 (2) of the Act as increased by direction of the Minister in accordance with Section 26 (1) of the Act.